

We claim:

1. A system for an engine having at least a first and second cylinder, the cylinders each having at least an intake and an exhaust valve, the system comprising:

5 a controller configured to:

operate the engine in a first mode where at least both the first cylinder and second cylinder open and close at least both their respective intake and exhaust valves to induct air, combust said air with injected fuel, and exhaust combusted gas products;

10 operate the engine in a second mode where at least one of the first cylinder and second cylinder opens and closes its intake and exhaust valves to induct air, combust said air with injected fuel, and exhaust combusted gas products, and the other of said first and second cylinders opens and closes at least one of its intake or exhaust valves while maintaining at least the other of its intake or exhaust valves closed during a cycle of the engine;

15 operate the engine in a third mode where one of said first and second cylinders operates with at least both intake and exhaust valves closed during a cycle of the engine; and

20 selecting at least one of said first, second and third modes based on an operating condition.

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2. The system recited in claim 1, wherein said fuel is injected directly into the engine cylinder.

3. The system recited in claim 1, wherein said fuel is injected indirectly into an intake port of the engine.

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4. The system recited in claim 1, wherein said control is further configured to provide a fourth mode where at least both the first cylinder and second cylinder open and close at least both their respective intake and exhaust valves to induct air, without injected fuel.

5. The system recited in claim 1, wherein said controller is further configured to select from said first, second and third modes based on an engine operating condition.

6. The system recited in claim 1, wherein said controller is further configured, during said third mode, to operate the other of said cylinders to open and close at least both its respective intake and exhaust valves to induct air, combust said air with injected fuel, and exhaust combusted gas products.

7. The system recited in claim 1, wherein said operating condition is an engine operating condition.

8. The method recited in claim 7, wherein said engine operating condition is an engine speed.

9. The method recited in claim 7, wherein said engine operating condition is an engine load.

10. The system recited in claim 1, wherein said controller is further configured to stop fuel injection to deactivated cylinders.

11. The system recited in claim 1, wherein said controller is further configured to adjust valve opening and closing times in said second mode of said group opening its exhaust valve while maintaining at least its intake closed, wherein said adjusting  
5 is based on engine load and speed.

12. The system recited in claim 1, wherein said controller is further configured to maintain pressure in deactivated cylinders above crank case pressure to reduce oil consumption during  
10 selected conditions.

13. The system recited in claim 1, wherein during said second mode, the other of said first and second cylinders opens and closes at least an exhaust valve while maintaining at least an  
15 intake valve closed.

14. The system recited in claim 1, wherein during said second mode, the other of said first and second cylinders opens and closes at least an intake valve while maintaining at least an  
20 exhaust valve closed.

15. A system for an engine having at least a first and second cylinder, the cylinders each having at least an intake and an exhaust valve, the system comprising:

a controller configured to:

5           operate the engine in a first mode where at least both the first cylinder and second cylinder open and close at least both their respective intake and exhaust valves to induct air, combust said air with injected fuel, and exhaust combusted gas products;

10           operate the engine in a second mode where at least one of the first cylinder and second cylinder opens and closes its intake and exhaust valves to induct air, combust said air with injected fuel, and exhaust combusted gas products, and the other of said first and second cylinders opens and  
15           closes at least its exhaust valve while maintaining at least its intake valve closed during a cycle of the engine;

            operate the engine in a third mode where one of said first and second cylinders operates with at least both intake and exhaust valves closed during a cycle of the  
20           engine; and

            selecting at least one of said first, second and third modes based on an operating condition.

16. The system recited in claim 14, wherein said fuel is  
25           injected directly into the engine cylinder.

17. The system recited in claim 14, wherein said fuel is injected indirectly into an intake port of the engine.

18. The system recited in claim 14, wherein said control is further configured to provide a fourth mode where at least both the first cylinder and second cylinder open and close at least both their respective intake and exhaust valves to induct air, without injected fuel.

19. The system recited in claim 14, wherein said controller is further configured to select from said first, second and third modes based on an engine operating condition.

20. The system recited in claim 14, wherein said controller is further configured, during said third mode, to operate the other of said cylinders to open and close at least both its respective intake and exhaust valves to induct air, combust said air with injected fuel, and exhaust combusted gas products.

21. The system recited in claim 14, wherein said operating condition is an engine operating condition.

22. The method recited in claim 20, wherein said engine operating condition is an engine speed.

23. The method recited in claim 20, wherein said engine operating condition is an engine load.

24. The system recited in claim 14, wherein said controller is further configured to stop fuel injection to deactivated cylinders.

25. The system recited in claim 14, wherein said controller is further configured to adjust valve opening and closing times in said second mode of said group opening its exhaust valve while maintaining at least its intake closed, wherein said adjusting  
5 is based on engine load.

26. The system recited in claim 14, wherein said controller is further configured to maintain pressure in deactivated cylinders above crank case pressure to reduce oil consumption during  
10 selected conditions.